Matthew Drennan Simpson

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EDUCATION

Ph.D., Atmospheric Science, North Carolina State University, July of 2006. Dissertation: Role of urban land use on mesoscale circulations and precipitation.

Master of Science, Atmospheric Science, North Carolina State University, August 2003. Thesis: Observational Analysis and Modeling of the Land-Ocean-Atmosphere Interaction during INDOEX (1999).

Bachelor of Science, Meteorology, North Carolina State University, May 2001.

PROFESSIONAL EXPERIENCE

Lawrence Livermore National Laboratory, July 2006 – present.

- Improved numerical modeling capabilities by creating script to download real time NWP initial conditions and run a high resolution ensemble based WRF modeling system.
- Provided dispersion modeling products to federal agencies as a response to atmospheric release emergencies with potential adverse effects to human health.
- Developed program to estimate 2-D boundary layer height growth from routine observations for use in a dispersion model.
- Wrote code to combine surface and upper air data to create climatological vertical profiles for use in atmospheric release assessments.

State Climate Office of North Carolina, Spring 2001 – July 2006.

Mesoscale Modeling
- Simulated significant meteorological events over India, Oklahoma City, and North Carolina using the MM5 mesoscale model.
- Communicated research methods and conclusions in journal papers and presented results at atmospheric science conferences.

Dispersion Modeling
- Used MM5 output to generate wind fields for the CALPUFF dispersion model.
- Modeled the emission and dispersion of particulate matter along major road sources over Wake County, NC in collaboration with the US EPA.

- Simulated the transport of anthropogenic gases and aerosols from India over the Arabian Sea during the northeast monsoon season.

Applied Meteorology
- Derived the height of the convective boundary layer from wind profiler data measured during Joint URBAN (2003) to compare with AERMET estimated mixing heights while visiting the Lawrence Livermore National Laboratory.

TECHNICAL EXPERIENCE

- Atmospheric Models: WRF (4 yrs), MM5 (7 yrs)
- Dispersion Models: Calpuff, Aermod, Flexpart
- Graphics: RIP4, Graph, GrADS, Vis5d, Illustrator CS, Matlab
- Scripting: Perl, Python, php
- Various: Geographic Information Systems (GIS) ArcView v. 8.1, Fortran 95

AWARDS

Global Change Fellowship, 83rd AMS Conference, Long Beach, CA 2003.

RESEARCH INTERESTS

Renewable Energy Forecasting, Mesoscale Modeling, Data Assimilation, Air Pollution Modeling, Urban Boundary Layer, Dispersion Modeling, Tropical Cyclone Processes and Monsoon Dynamics, and Environmental Impact Assessments.

PUBLICATIONS

1. Raman,S., D.S. Niyogi, M. Simpson, and J. Pelon, 2002: Dynamics of the elevated land plume over the Arabian sea and the northern Indian ocean during northeasterly monsoon (INDOEX), *Geophysical Research Letter*, 29, 641-644.

2. Simpson, M., and S. Raman, 2004: Role of the land plume in the transport of ozone over the ocean during INDOEX (1999), *Boundary-Layer Meteorology*, 111, 133-152.

3. Simpson, M., and S. Raman, 2005: Development and propagation of a pollution gradient in the marine boundary layer during INDOEX (1999), *Journal Earth System Science*, 114, No. 1, 3-16.

4. Simpson, M., and S. Raman, 2006: Observations and numerical simulation of the sea and land breeze circulations along the west coast of India, *Indian Journal of Marine Science*, Vol. 35(2), 139-152.

5. Simpson, M., H. Warrior, S. Raman, P.A. Aswathanarayana, U.C. Mohanty, and R. Suresh, 2006: Sea breeze Initiated Rainfall over the East Coast of India during the

Indian Southwest Monsoon, *Journal of Natural Hazards*: Special Monsoon Issue (DOI-10.1007/s11069-006-9081-2).

6. Simpson, M., S. Raman, J. K. Lundquist, and M. Leach, 2007: A study of the variation of urban mixed layer heights, *Atmospheric Environment*, Vol 41, 6923-6930.

7. Simpson, M., S. Raman, R. Suresh, and U.C. Mohanty, 2009: Urban effects of Chennai on sea breeze induced convection and precipitation, *J. Earth Syst*. Sci., 117, No. 6, 897-909.

8. Delle Monache, L., Weil, J., Simpson, M., and M. Leach, 2009: A new urban boundary layer and dispersion parameterization for an emergency response modeling system: tests with the Joint Urban 2003 data set, *Atmospheric Environment*, 5807-5821.

9. Aines, R., M. Leach, T. Weisgraber, M. Simpson, S. J. Friedmann, and C. Bruton, 2009: Quantifying the potential exposure hazard due to energetic releases of CO2 from a failed sequestration well. Energy Procedia, 2421-2429.

10. Gloster, J., Jones, A., Redington, A., Burgin, L., Sorensen, J.H., Turner, R., Dillon, M., Hullinger, P., Simpson, M., Astrup, P., Garner, G., Stewart, P., D'Amours, R., Sellers, R., and Paton, D., 2010: Airborne spread of foot-and-mouth disease - Model intercomparison. The Veterinary Journal. 183. 278-286.

11. Sugiyama, G., Nasstrom, J., Pobanz, B., Foster, K., Simpson, M., Vogt, P., Aluzzi, F., Homann, S., 2012: Atmospheric Dispersion Modeling: Challenges of the Fukushima Daiichi Response. Health Phys, 102, 493–508.

CONFERENCE PRESENTATIONS

1. Matthew Simpson, S. Raman, H. Warrior, U.C. Mohanty, and R. Suresh, Simulation of sea breeze induced convection and rainfall over Chennai and surrounding region during Indian southwest monsoon. Presented at Dehli, India Conference 2006.

2. Matthew Simpson, S. Raman, U. C. Mohanty, and R. Suresh, Urban effects on convergence and convection over Chennai, India. Presented at the 2006 AMS Annual Meeting, Atlanta, Georgia.

3. Simpson, M., M. Puryer, and S. Raman. Modeling pollution transport over the Arabian Sea during INDOEX (1999). Presented at 9th Annual GMU Conference on Atmospheric Transport and Dispersion Modeling, Fairfax, Virginia, 18-20 July 2005.

4. Simpson, M., S. Raman, and A. Huber. An urban mixed layer climatology for North America using the AERMET model. Presented at AMS 15th Conference on Applied Climatology, Savannah, Georgia, 20-24 June 2005.

5. Simpson, M., S. Raman, J. K. Lundquist, and M. Leach. Estimating convective mixing heights during Joint URBAN (2003). Presented at AMS Atmospheric Sciences and Air Quality Conference, San Francisco, California, 27-29 April 2005.

6. Simpson, M. and S. Raman. Development and propagation of a pollution gradient in the marine boundary layer during INDOEX (1999). Presented at AMS 26th Conference on Hurricanes and Tropical Meteorology, Miami, FL, 3-7 May 2004.

7. Raman, S., M. Simpson, and N. Jacobs. Scale interaction in tropical and mid-latitude cyclones. Presented at the International Conference on Scale Interaction and Variability of Monsoon, Munnar, India, 6-10 October 2003.

8. Simpson, M. and S. Raman. Development of the land plume and its structure during INDOEX (1999). Presented at 83rd Annual AMS Meeting, Long Beach, CA, 9-13 February 2003.

9. Childs, P., Dev Niyogi, S. Raman, A. Sims, and M. Simpson. Effect of two MM5 land surface parameterizations on an inland tropical storm simulation. Presented at AMS 25th Conference on Agricultural and Forest Meteorology, Norfolk, Virginia, 20-24 May 2002.

10. Delle Monache., L., Weil, J., Leach, M., Simpson, M., Leone, J., Loosmore, G., 2007. An urban boundary layer and dispersion parameterization for the LLNL NARAC modeling system. Poster presentation at *AGU Fall Meeting 2007*, San Francisco, California.

11. Delle Monache., L., Weil, J., Leach, M., Simpson, M., Leone, J., Loosmore, G., 2007. A urban boundary layer and dispersion parameterization for the LLNL NARAC modeling system: tests with the Joint Urban 2003 Field Project data set. *7th AMS Symposium on the Urban Environment*, San Diego, California.

12. Delle Monache., L., Weil, J., Leach, M., Simpson, M., Leone, J., Loosmore, G., 2007. A urban boundary layer and dispersion parameterization for the LLNL NARAC modeling system: Preliminary tests with the Joint Urban 2003 field project data set. *11th Annual George Mason University Conference on Atmospheric Transport and Dispersion Modeling*, Fairfax, Virginia.